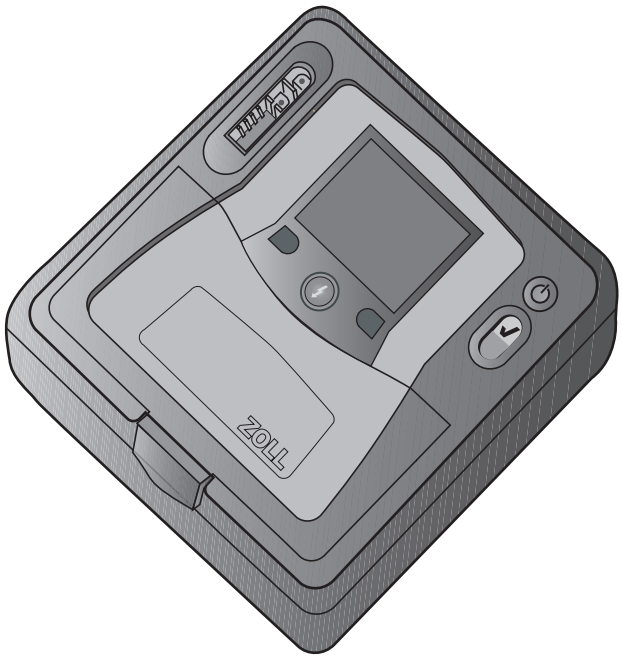
ZOLL®

Advancing Resuscitation. Today.™

AEDPRO®

Service Manual

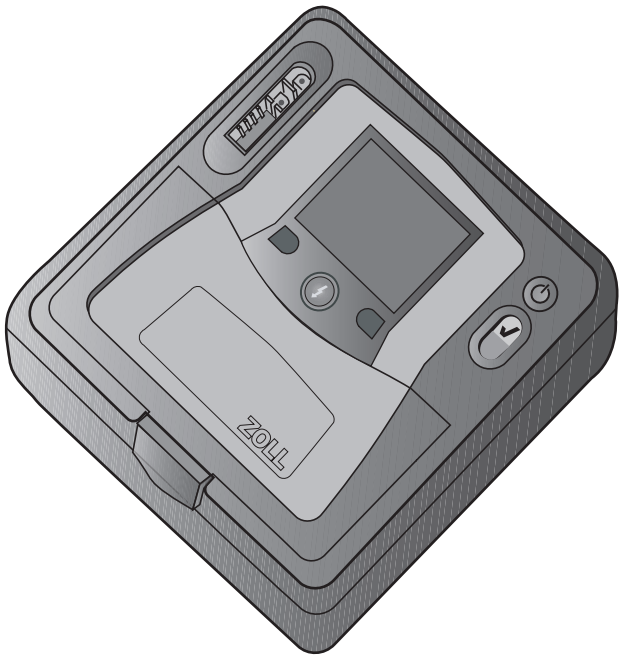


ZOLL®

Advancing Resuscitation. Today.™

AEDPRO®

Service Manual



February 2007

9650-0309-01 Rev. A

An issue date and revision level for this guide appear on the title page.

If more than three years have elapsed since this date, contact ZOLL Medical Corporation to determine if additional product information updates are available.

ZOLL, AED Pro, CodeNet, ***stat•padz***, ***pedi•padz***, ***pro•padz***, and ***v•pack*** are registered trademarks of ZOLL Medical Corporation. AED Plus, PowerCharger, Preconnect, RescueNet, Smart Alarms, ***CPR-D•padz***, Rectilinear Biphasic, SurePower, “Real CPR Help,” and “Advancing Resuscitation. Today.” are trademarks of ZOLL Medical Corporation. All other trademarks and registered trademarks are property of their respective owners.

Copyright © 2007 ZOLL Medical Corporation. All rights reserved.

Table of Contents

Preface

Related Documentation iv
Conventions iv
Symbols v
Warranty vi
Safety Considerations vi
Technical Service vii
Returning a Unit for Service vii

Chapter 1 Maintenance Tests

Preparations for Testing 1-2
Test Equipment 1-2
1.0 Physical Inspection 1-3
2.0 Preventive Maintenance Test 1-4
3.0 Battery Check 1-9
4.0 ECG Monitoring (Optional) 1-9
5.0 Manual Self-Test 1-10

Chapter 2 Troubleshooting

Troubleshooting the AED Pro Unit 2-2
ECG Monitoring Troubleshooting 2-4
Defibrillator Troubleshooting 2-5
AED Pro Error Log Messages 2-6

Appendix A Maintenance Tests Checklist

Instructions A-2
ZOLL AED Pro Maintenance Tests Checklist A-3

Index

Preface

ZOLL Medical Corporation provides this manual for technicians who service the AED Pro® device or diagnose malfunctions. This manual contains the following sections:

Preface — Provides safety warnings and an overview of the manual's contents. Review this section thoroughly before servicing an AED Pro unit.

Chapter 1, "Maintenance Tests" — Provides the recommended procedures for evaluating the condition and performance of an AED Pro unit.

Chapter 2, "Troubleshooting" — Describes possible problems and solutions and lists the error log messages that indicate the unit requires technical service.

Appendix A, "Maintenance Tests Checklist" — Provides a checklist for recording the results of maintenance tests.

Note: The AED Pro contains no user-replaceable parts.

Related Documentation

In addition to this service manual, the following manuals are available for the AED Pro unit:

- *AED Pro Operator's Guide* (9650-0350-01) — Describes the device and its controls, the clinical modes of operation, and nonclinical functions.
- AED Pro *Simulator Operator's Guide* (9651-0801-01) — Describes the AED Pro simulator, which you can use to test the AED Pro unit's response to various simulated cardiac rhythms.

Conventions

This manual uses uppercase italics for messages that are voiced or displayed on the screen (for example, *DON'T TOUCH PATIENT, ANALYZING*).

Within text, the names and labels for physical buttons and softkeys appear in **boldface** type (for example, "Press the **Shock** button or the **DISARM** softkey.")

	Within test or troubleshooting procedures, this symbol indicates an audible prompt or message; for example: *START CPR*

WARNING! **Warning statements alert you to conditions or actions that can result in personal injury or death.**

Caution Caution statements alert you to conditions or actions that can result in damage to the unit.

Symbols

The following symbols might appear in this document or on the equipment:

Symbol	Description
	Defibrillation-proof type BF equipment.
	Attention, consult accompanying documents.
	Dangerous voltage
	Conformité Européenne — Complies with medical device directive 93/42/EEC.
	Keep away from open flame and high heat.
	Do not open, disassemble, or intentionally damage.
	Do not crush.
	Nonrechargeable battery.
	Contains lead. Recycle or dispose of properly.
	Contains lithium. Recycle or dispose of properly.
	Do not discard in trash. Recycle or dispose of properly.

	Manufacturer.
	Authorized representative in the European Community.
	Serial Number.
	Catalogue number.
	Consult instructions for use.
	Waste Electrical and Electonic Equipment

Warranty

For warranty information, refer to the *AED Pro Operator's Guide*.

To maintain the warranty, strictly follow the instructions and procedures in this service manual. Unit failure that is attributable to the use of accessories that are not manufactured by ZOLL might void the ZOLL warranty.

Safety Considerations

Only qualified personnel should service or disassemble an AED Pro unit. Before using, servicing, or disassembling this device, read the *AED Pro Operator's Guide*. Before servicing or disassembling any equipment, review these safety considerations and read this manual carefully.

WARNING! The AED Pro unit can generate as much as 2500 volts with sufficient current to cause lethal shocks.

Before discharging the defibrillator, warn everyone to stand clear of the patient and equipment.

Never discharge the unit with the defibrillation pads shorted together or in open air.

Do not disassemble a battery pack or dispose of it in fire. Do not try to recharge a nonrechargeable battery pack. If mistreated, a battery pack might explode.

This device is protected against interference from radio frequency emissions typical of the two-way radios and cellular telephones used in emergency service or public safety activities. You should assess the device's performance in your typical operating environment to determine the likelihood of radio frequency interference (RFI) from high-power sources.

Technical Service

If the AED Pro unit requires service, contact the ZOLL Technical Service Department.

Telephone: 1-800-348-9011 (U.S.A. customers only)
1-978-421-9655

Fax: 1-978-421-0010

When requesting service, please provide the following information to the service representative:

- Unit serial number
- Description of the problem
- Department using the equipment and the name of the person to contact
- Purchase order to allow tracking of loan equipment
- Purchase order for a unit with an expired warranty

Returning a Unit for Service

Before sending a unit to the ZOLL Technical Service Department for repair, obtain a service request (SR) number from the service representative.

Remove the battery pack from the unit. Pack the unit with its cables in the original containers (if available) or equivalent packaging. Be sure the assigned service request number appears on each package.

For customers	Return the unit to
In the U.S.A.	ZOLL Medical Corporation 269 Mill Road Chelmsford, MA 01824-4105 Attention: Technical Service Dept. [SR number] Telephone: 1-800-348-9011

(continued)

For customers	Return the unit to
In Canada	ZOLL Medical Canada Inc. 1750 Sismet Road, Unit #1 Mississauga, Ontario L4W 1R6 Attention: Technical Service Department *(SR number)* Telephone: 1-866-442-1011
In other locations	The nearest authorized ZOLL Medical Corporation representative. To locate an authorized service center, contact the International Customer Service at ZOLL Medical Corporation 269 Mill Road Chelmsford, MA 01824-4105 Telephone: 1-978-421-9655

Chapter 1
Maintenance Tests

This chapter describes the procedures for routine testing of the AED Pro® unit.

A test typically consists of multiple steps, each of which requires a pass/fail rating. For each step, perform the specified action and then verify that the expected results occur. If all expected results occur, assign a "Pass" rating to the step; otherwise, assign it a "Fail" rating.

This chapter includes the following inspection and test procedures:

- "1.0 Physical Inspection" on page 1-3
- "2.0 Preventive Maintenance Test" on page 1-4
- "5.0 Manual Self-Test" on page 1-10

Preparations for Testing

- Gather the required equipment listed in the next section.
- Perform all the steps within each test procedure in the order specified.

If testing results indicate that the battery pack must be replaced, you will need a fully charged spare battery pack.

Test Equipment

For some tests, you need one or more of these items:

- ZOLL defibrillation analyzer (universal) adapter cable (8000-0804-01)
- Fluke Impulse 4000 Defibrillator/Pacer Performance Analyzer (Fluke Biomedical/ DNI Nevada) with 1.06 software or higher

The following items are optional:

- ZOLL AED Pro Simulator —
  When connected to an AED Pro unit, the simulator can send it various simulated cardiac rhythms (ventricular fibrillation, normal sinus rhythm, or asystole) and optional simulated chest compression readings (rate and depth), so that you can test the unit's response.
- ZOLL Administration Software (ZAS) for Windows 2000, or XP Pro —
  When installed on a personal computer that has an IrDA (wireless infrared) interface, the ZAS application can communicate with an AED Pro unit in nonrescue mode to retrieve its usage history, hardware and software configuration, and error log. You can also use ZAS to view or modify the unit's configurable settings and to retrieve event data.
- ZOLL 3-lead ECG cable (8000-0838)

For ZOLL part numbers, refer to the accessories list in the *AED Pro Operator's Guide*.

1.0 Physical Inspection

Use this procedure to ensure that the unit shows no signs of damage or excessive wear.

Tools Needed

None.

Test Setup

None.

Test Procedure

Observe the following:		Pass	Fail
1.1	Is the unit clean?	❑	❑
1.2	Are all signs of wear reasonable and not excessive?	❑	❑
1.3	Are the front panel and housing undamaged and free of cracks?	❑	❑
1.4	Are input connectors clean and undamaged?	❑	❑
1.5	Are electrodes preconnected, is the cable free from damage, are the pads sealed within the packaging, and are the electrodes within the expiration date shown on the package?	❑	❑
1.6	Is the battery older than 18 months? When was the last time the battery was tested?	❑	❑
1.7	If you are using an AED Pro 3-lead ECG cable, is it free from cuts or other visible damage?	❑	❑

2.0 Preventive Maintenance Test

Use this test to verify that the AED Pro unit is working properly and ready for use.

For an alternative test using the AED Pro simulator, refer to the *AED Pro Operator's Guide*.

Note: To verify that the delivered energy for the first, second, and third shocks corresponds to the unit's preconfigured adult energy levels, use the ZOLL Administration Software (ZAS) to obtain the current configuration of the unit.

Tools Needed

- Fluke Impulse 4000 Defibrillator/Pacer Performance Analyzer or equivalent
- Defibrillation analyzer (universal) adapter cable

Test Setup

- Turn off the AED Pro unit and unplug the preconnected electrodes. Keep the electrodes so they can be reconnected later.
- Connect the universal adapter cable to the AED Pro unit and to the analyzer.
- Turn on the analyzer and set its function to VF (ventricular fibrillation).

Variations in Messages

When verifying messages in the test results, please be aware of the following issues:

- The wording of some messages is configurable. The following table shows equivalent messages.

Default Message	Alternative Message
CHECK PATIENT	*CHECK RESPONSIVENESS*
CHECK PULSE	*CHECK CIRCULATION*
IF NO PULSE START CPR	*IF NO CIRCULATION START CPR*
IF NO PULSE CONTINUE CPR	*IF NO CIRCULATION CONTINUE CPR*
SHOCK ADVISED	*TREATMENT ADVISED*
NO SHOCK ADVISED	*NO TREATMENT ADVISED*
PRESS FLASHING SHOCK BUTTON	*PRESS FLASHING TREATMENT BUTTON*
RELEASE SHOCK BUTTON	*RELEASE TREATMENT BUTTON*
SHOCK DELIVERED	*TREATMENT DELIVERED*
NO SHOCK DELIVERED	*NO TREATMENT DELIVERED*

- The message that reports the detected electrode type can be either *ADULT PADS*, *PEDIATRIC PADS*, or *ECG CABLE*.
- Some messages are issued only if the unit is configured to do so. If an optional message is not issued during a test, do not consider this a failure.
- In some cases a text message on the display screen is abbreviated or otherwise differs slightly from the associated voice message.

Test Procedure

Test	Action	Expected Result(s)	Pass	Fail	N/A
2.1	Turn on the AED Pro unit. **Note:** Some AED Pro units are configured to start with CPR; therefore, these prompts will not be heard.	◀ *UNIT OK* ◀ *ADULT PADS* ◀ *CHECK RESPONSIVENESS* (or *CHECK PATIENT*) ◀ *DON'T TOUCH PATIENT, ANALYZING* ◀ *TREATMENT ADVISED* (or *SHOCK ADVISED*) ◀ *DON'T TOUCH PATIENT* ◀ *PRESS FLASHING TREATMENT BUTTON* (or *PRESS FLASHING SHOCK BUTTON*)	❑	❑	❑
2.2	Press the **Shock** button (first shock).	• Analyzer indicates a defibrillator discharge at the configured first-shock energy level (120, 150, or 200 joules) ±15%. ◀ *TREATMENT DELIVERED* (or *SHOCK DELIVERED*) • An updated shock count appears on the display. ◀ *DON'T TOUCH PATIENT, ANALYZING* ◀ *TREATMENT ADVISED* (or *SHOCK ADVISED*) ◀ *DON'T TOUCH PATIENT* ◀ *PRESS FLASHING TREATMENT BUTTON* (or *PRESS FLASHING SHOCK BUTTON*)	❑	❑	❑

Test	Action	Expected Result(s)	Pass	Fail	N/A
2.3	Press the **Shock** button (second shock). **Note:** If your AED Pro unit is not configured for stack shocks, skip to test 2.5.	• Analyzer indicates a defibrillator discharge at the configured second-shock energy level (120, 150, or 200 joules) ±15%. ◀ *TREATMENT DELIVERED* (or *SHOCK DELIVERED*) • An updated shock count appears on the display. ◀ *DON'T TOUCH PATIENT, ANALYZING* ◀ *TREATMENT ADVISED* (or *SHOCK ADVISED*) ◀ *DON'T TOUCH PATIENT* ◀ *PRESS FLASHING TREATMENT BUTTON* (or *PRESS FLASHING SHOCK BUTTON*)	❑	❑	❑
2.4	Press the **Shock** button (third shock). **Note:** If your AED Pro unit is not configured for stack shocks, skip to test 2.5.	• Analyzer indicates a defibrillator discharge at the configured third-shock energy level (120, 150, or 200 joules) ±15%. ◀ *TREATMENT DELIVERED* (or *SHOCK DELIVERED*) • An updated shock count appears on the display. These three prompts are optional: – *OPEN AIRWAY* – *CHECK BREATHING* – *GIVE TWO BREATHS* ◀ *CHECK CIRCULATION* (or *CHECK PULSE*) ◀ *IF NO CIRCULATION START CPR* (or *IF NO PULSE START CPR*)	❑	❑	❑

Test	Action	Expected Result(s)	Pass	Fail	N/A
	Turn off the AED Pro unit. Set the analyzer to NSR (normal sinus rhythm).				
2.5	Turn on the AED Pro unit.	◀ *UNIT OK* ◀ *ADULT PADS* ◀ *DON'T TOUCH PATIENT, ANALYZING*. ◀ *NO TREATMENT ADVISED* (or *NO SHOCK ADVISED*) These three prompts are optional: – *OPEN AIRWAY* – *CHECK BREATHING* – *GIVE TWO BREATHS* ◀ *CHECK CIRCULATION* (or *CHECK PULSE*) ◀ *IF NO CIRCULATION START CPR* (or *IF NO PULSE START CPR*)	❑	❑	❑
2.6	Lift the puck that is attached to the universal adapter cable. Move it up and down very slightly (no more than 1 inch or 2.5 cm) and continue to do so. On the display screen, prevent the bar on the chest compression gauge from extending into the area between the lower two lines.	• Unit emits spaced tones as a guide for performing chest compressions at the proper rate. ◀ *PUSH HARDER*	❑	❑	❑

Test	Action	Expected Result(s)	Pass	Fail	N/A
2.7	Increase the vertical motion of the puck (about 2 to 3 inches or 5.0 to 7.6 cm). On the display screen, make sure the bar on the chest compression gauge extends into the area between the lower two lines.	• Unit emits spaced tones as a guide for performing chest compressions at the proper rate. ◀ *GOOD COMPRESSIONS* The following prompt is optional: – *IF NO CIRCULATION CONTINUE CPR* (or *IF NO PULSE CONTINUE CPR*) ◀ *STOP CPR*	❑	❑	❑
	Put the puck down and turn off the AED Pro unit. Disconnect the universal adapter cable from the AED Pro unit.				
2.8	Wait 10 seconds and then turn on the AED Pro unit.	◀ *PLUG IN CABLE* ◀ *CHECK RESPONSIVENESS* (or *CHECK PATIENT*) ◀ *CALL FOR HELP* These three prompts are optional: – *OPEN AIRWAY* – *CHECK BREATHING* – *GIVE TWO BREATHS* ◀ *CHECK CIRCULATION* (or *CHECK PULSE*) ◀ *PLUG IN CABLE*	❑	❑	❑
2.9	Check the expiration date on the previously connected defibrillation electrodes. If the electrodes have not expired, reconnect them to the unit; otherwise, connect a fresh package of defibrillation electrodes.	◀ *ADULT PADS* (or *PEDIATRIC PADS*)	❑	❑	❑
	Turn off the AED Pro unit.				
2.10	After 90 seconds, check the Ready indicator on the unit.	• The Ready indicator shows a green check.	❑	❑	❑

3.0 Battery Check

Use this procedure to ensure that the battery shows no signs of damage or excessive wear.

Tools Needed

None.

Test Setup

None.

Test Procedure

Test	Action	Expected Result(s)	Pass	Fail	N/A
3.1	Open battery door and verify that the battery has no signs of visible damage.		❑	❑	❑
3.2	For a sealed lead acid battery, verify that the battery is not older than 18 months (if it is older than 18 months, ZOLL recommends that you replace the battery).		❑	❑	❑

4.0 ECG Monitoring (Optional)

Use this procedure to ensure that the ECG cable shows no signs of damage or excessive wear.

Tools Needed

- Fluke Impulse 4000 Defibrillator/Pacer Performance Analyzer or equivalent
- 3-lead ECG cable

Test Setup

None.

Test Procedure

Test	Action	Expected Result(s)	Pass	Fail	N/A
4.1	Insert the ECG cable into the connector on the AED Pro. Connect the leads to the analyzer and set to NSR (normal sinus rhythm).		❑	❑	❑
4.2	Turn on the AED Pro unit.	Verify that the rhythm is displayed.	❑	❑	❑
4.3	Grasp the ECG cable and leads and gently move them back and forth.	Verify that the signal is not distorted.	❑	❑	❑

5.0 Manual Self-Test

Use this test to initiate the unit's self-diagnostic procedure, which verifies the following:

- Battery usage since last reset.
- Defibrillation electrodes are properly connected.
- ECG signal acquisition and processing electronics are functional.
- Defibrillator charge and discharge circuitry (operational at 2 joules) is functional.
- Microprocessor hardware and software are functional.
- CPR monitoring circuitry and compression depth sensor are functional (when ZOLL *CPR-D•padz* are attached).
- Audio output circuitry is functional.
- Display screen is functional.

Tools Needed

- None.

Test Setup

- Turn off the AED Pro unit.
- If they are not already in place, preconnect defibrillation electrodes to the unit.

Test Procedure

Test	Action	Expected Result(s)	Pass	Fail
5.1	Press and hold the **On/Off** button for at least 5 seconds.	• Within 10 seconds after the unit is turned on, the Ready indicator displays a green check. ◀ *UNIT OK*	❑	❑
	If an IrDA connection is established, turn off the unit; otherwise, the unit shuts down automatically.			

Chapter 2
Troubleshooting

This chapter describes technical issues commonly encountered during routine maintenance or after a malfunction of the AED Pro unit and recommends steps to solve the problem. This chapter also lists AED Pro error log messages that indicate the unit requires technical service.

This chapter contains the following:

- "Troubleshooting the AED Pro Unit" on page 2-2
- "AED Pro Error Log Messages" on page 2-6

If this chapter does not help you resolve the problem, call the ZOLL Technical Service Department for assistance. For contact information, refer to "Technical Service" on page vii.

Troubleshooting the AED Pro Unit

Table 2-1 lists general issues with the unit and their associated corrective action.

First, try the recommendations given under "Operator Action." If these steps do not remedy the problem, follow the suggestions under "Technical Action."

For information on contacting ZOLL Technical Service, refer to page vii.

Table 2-1. General Issues

Symptom	Operator Action	Technical Action
Unit beeps or displays a red "X" while turned off.	— Turn the unit on. Follow the prompts to resolve the problem.	If the beeping continues, take the unit out of service. Contact ZOLL Technical Service.
Ready indicator shows a red "X" while the device is powered on.	— Turn the unit off and then on again. Follow the prompts to resolve the problem.	If the red "X" remains, take the unit out of service. Contact ZOLL Technical Service.
Power-on self-test failed.	— Follow the prompts to resolve the problem.	If the unit continues to fail, take it out of service. Contact ZOLL Technical Service.
Unexpected shutdown in clinical mode.	**Note:** In clinical mode, the unit automatically powers off if it does not detect a patient connection within 10 minutes (configurable). — Turn the unit on. Follow the prompts to resolve the problem.	If the unit continues to fail, take it out of service. Contact ZOLL Technical Service.
Unexpected shutdown in nonrescue mode.	**Note:** The unit automatically powers off if an established IrDA connection is lost. — Press and hold the **On/Off** button for at least 5 seconds. Follow the prompts to resolve the problem.	If the unit still is not ready for use, take it out of service. Contact ZOLL Technical Service.
◀ *CHANGE BATTERY*	— Replace the battery pack with a fully charged battery pack as soon as possible.	None.
◀ *PLUG IN CABLE*	— Ensure that the electrode cable is properly connected to the unit. — Remove the cable and check for bent or broken pins. — Replace the electrode cable.	None.
◀ *ANALYSIS HALTED KEEP PATIENT STILL*	— Keep the patient still during ECG analysis. If transporting the patient by stretcher or vehicle, stop all patient movement during ECG analysis.	None.

Table 2-1. General Issues (continued)

Symptom	Operator Action	Technical Action
◀ *RELEASE SHOCK BUTTON*	— Release the **Shock** button. Wait until the unit issues the prompt *PRESS FLASHING SHOCK BUTTON* before pressing the button.	None.
◀ *PLUG IN DEFIB CABLE*	**Note:** This prompt appears if an ECG cable is connected, but the unit is not configured for ECG monitoring. — Check the cable and replace if necessary.	None.
◀ *RELEASE LEFT SOFTKEY* or ◀ *RELEASE RIGHT SOFTKEY*	— Release the softkey.	None.

ECG Monitoring Troubleshooting

Table 2-2 lists common issues with ECG monitoring and their associated corrective action.

Table 2-2. ECG Monitoring Issues

Symptom	Corrective Action
◀ *CHECK ECG ELECTRODES* or ◀ *ATTACH ECG ELECTRODES*	Ensure that the ECG cable is connected to each electrode and to the unit. Ensure that the ECG electrodes are making good contact with the patient and are not dried out. Replace the ECG electrodes. Replace the ECG cable.
Noisy ECG, artifact, or wandering baseline.	Turn off nearby two-way radios and cell phones. Before attaching electrodes, properly prepare the patient's skin (refer to the *AED Pro Operator's Guide*). Ensure proper adhesion of the electrodes to the patient. Arrange the ECG cable so that it does not pull on any of the electrodes.
Poor ECG signal level.	Replace the ECG electrodes and change their position on the patient.
Irregular heart rate.	Observe the patient's ECG. Verify that the irregular heart rate is not caused by noise, low amplitude R waves, extra-systoles, or arrhythmia. Replace the ECG electrodes and change their position on the patient.
◀ *PLUG IN DEFIB CABLE*	ECG analysis detected a shockable rhythm. Replace the ECG electrodes and cable with defibrillation pads to deliver therapy.

Defibrillator Troubleshooting

Table 2-3 lists common issues with defibrillation and their associated corrective action.

Table 2-3. Defibrillator Issues

Symptom	Corrective Action
Defibrillator does not charge.	(Semiautomatic mode only) The patient's ECG rhythm is not shockable because it is not either ventricular fibrillation (VF) or wide-complex ventricular tachycardia (VT), or is VF with amplitude less than 100 μV. Confirm that the defibrillation cable is plugged in and the pads are attached to the patient. Install a fully charged battery pack.
Defibrillator takes more than 15 seconds to charge.	Install a fully charged battery pack.
Energy does not discharge when the **Shock** button is pressed.	A fully charged defibrillator automatically disarms itself after 60 seconds in manual mode or 30 seconds in semiautomatic mode. Charge the defibrillator again and deliver the shock while the charge-ready tone sounds. The **Shock** button was pressed before the unit was fully charged. Wait for the charge-ready tone and a flashing **Shock** button before pressing and holding the **Shock** button.
No apparent energy delivery to patient.	Under certain circumstances, a patient might not display a physical reaction when energy is delivered. Replace the electrodes if they are dried out or expired. Ensure that the electrodes are making proper contact with the patient's skin. Test the defibrillator. If the prompt *CHECK DEFIB PADS* appears, check and correct the attachment or position of the electrodes.
◀ *CHECK DEFIB PADS*	Ensure that the defibrillation electrode pads are making proper skin contact and that the patient does not have excessive hair beneath electrodes. If message persists, change the defibrillation cable.
◀ *ANALYSIS HALTED* *KEEP PATIENT STILL*	Check for proper application and adhesion of the defibrillation electrode pads. Ensure that no one is touching the patient and that the patient is motionless during ECG analysis.
◀ *DEFIB MAINTENANCE REQUIRED*	Contact ZOLL Technical Service.

AED Pro Error Log Messages

The AED Pro unit records internal errors in an error log, which you can retrieve by using a Windows-based personal computer with ZOLL Administration Software (ZAS).

To retrieve the error log, follow these steps:

Step	Action
1	Turn off the AED Pro unit.
2	Start the ZOLL Administration Software (ZAS) on the computer.
3	Position the AED Pro unit so that its IrDA port has a clear line-of-sight with the computer's IrDA port and the ports are about 10 to 18 inches (25 to 45 cm) apart.
4	Press and hold the unit's **On/Off** button for at least 5 seconds to start the unit in nonrescue mode.
5	After the unit issues the message *COMMUNICATIONS ESTABLISHED*, refer to the ZAS help for instructions on saving the unit's history file and viewing the included error log.

After saving the error log file on the computer, you can use ZAS to clear the error log on the AED Pro unit.

Table 2-4 lists critical error log messages.

Important: If any of these messages appears in the error log, contact ZOLL Technical Service as described on page vii.

Table 2-4. AED Pro Error Log Messages

Error No.	Error Message
1	The patient relay is not working properly
2	Attempting to charge the capacitor while the SAFELINE in the CPLD is set - should not charge
3	The capacitor takes too long to charge
4	The H-bridge test failed while the bridge was disabled. There should have been 0 current measured.
5	VCAP1 and VCAP2 are not within a defined range of each other
6	The H-bridge test failed while the bridge was enabled - an invalid current reading was taken during the positive test on the H-bridge
7	The H-bridge test failed while the bridge was enabled - an invalid current reading was taken during the negative test on the H-bridge
8	Defib did not charge during the power-on charge test
9	The Defib task is not receiving A2D vCap1 event samples - needed for charging
10	FnSafety has determined that the charge has dropped below a specified value during the holding of charge.
11	The capacitor failed to charge
12	The capacitor over-charged
13	The capacitor contained an unsafe voltage in an idle state

Table 2-4. AED Pro Error Log Messages (continued)

Error No.	Error Message
14	Patient impedance experienced a short
15	The A2D is getting non-accurate readings during its test
17	The message queue overflowed
18	PowerOn task has timed out while waiting for a self test result to come back.
19	Calibration faults that occur during a clinical event.
20	An unexpected error has occurred when calling a Nucleus operation.
21	An unexpected error has occurred when calling a Rhapsody operation.
22	An unexpected coding error has occurred.
23	No Language installed - corrupt language.
24	The shock button is pressed/stuck.
25	The ECG Calibration data is invalid
26	The Patient Impedance Calibration data is invalid
27	A critical flash error has occurred
28	The WatchDog is not enabled during clinical event
29	The clock test failed
Note: Error numbers 256 and greater indicate noncritical conditions.	

Appendix A
Maintenance Tests Checklist

This appendix provides a sample maintenance checklist for the AED Pro unit. To ensure that the equipment is functioning properly and ready for emergency use, complete the checklist periodically according to local protocols.

Your organization can create custom checklists for your specific requirements.

Instructions

To maintain records for maintenance testing, photocopy the checklist shown on the following pages. The checklist includes an entry for each test described in this manual. Use these copies to record the results of your testing and then retain the copies for your records.

ZOLL AED Pro
Maintenance Tests Checklist

Use this checklist to record the results of AED Pro maintenance tests and keep it for your records. For a description of each numbered test, refer to Chapter 1, "Maintenance Tests" in the *AED Pro Service Manual.*

Serial No.	
Location	
Date	
Tester	
Signature	

Result of Check:

- ☐ No action required
- ☐ Minor problems corrected
- ☐ Disposable supplies replaced
- ☐ Major problems identified (unit out of service)

Additional Remarks

	PASS	FAIL
1.0 Physical Inspection		
1.1	☐	☐
1.2	☐	☐
1.3	☐	☐
1.4	☐	☐
1.5	☐	☐
1.6	☐	☐
1.7	☐	☐

	PASS	FAIL	N/A
2.0 Preventive Maintenance Test			
2.1	☐	☐	☐
2.2	☐	☐	☐
2.3	☐	☐	☐
2.4	☐	☐	☐
2.5	☐	☐	☐
2.6	☐	☐	☐
2.7	☐	☐	☐
2.8	☐	☐	☐
2.9	☐	☐	☐
2.10	☐	☐	☐

	PASS	FAIL	N/A
3.0 Battery Check			
3.1	☐	☐	☐
3.2	☐	☐	☐

	PASS	FAIL	N/A
4.0 ECG Monitoring (Optional)			
4.1	☐	☐	☐
4.2	☐	☐	☐
4.3	☐	☐	☐

	PASS	FAIL
5.0 Manual Self-Test		
5.1	☐	☐

Index

A

Adapter cable, universal 1-2, 1-4
Administration software, ZOLL 1-2, 2-6
Analyzer 1-2, 1-4, 1-9

B

Batteries 1-2

C

Cable, universal adapter 1-2, 1-4
Checklists for maintenance tests A-1
Configurable prompts 1-4
Conventions used in manual iv

D

Defibrillator analyzer 1-2, 1-4, 1-9
Defibrillator troubleshooting 2-5
Documentation iv

E

ECG troubleshooting 2-4
Error log 2-6

H

History file, device 2-6

I

Impulse 4000 analyzer 1-2, 1-4, 1-9
Inspection, physical 1-3
IrDA port 1-2

L

Log, error 2-6

M

Maintenance tests 1-1
  checklists A-1
  equipment needed 1-2
  prerequisites 1-2
  preventive 1-4
Manual self-test 1-10
Manuals, related iv
Messages
  error log 2-6
  wording 1-4

P

Physical inspection 1-3
Port, IrDA 1-2
Preventive maintenance test 1-4
Prompts, configurable 1-4

R

Radio frequency interference vii
Repairs vii
Returns vii
RFI vii

S

Safety considerations vi
Self-test, manual 1-10
Service, technical vii
Simulator iv, 1-2
Software, ZOLL Administration 1-2, 2-6
Symbols on equipment v

T

Technical Service vii
Tests, maintenance 1-1
  checklist A-1
  prerequisites 1-2
Troubleshooting 2-1
  common problems 2-2
  defibrillator 2-5
  ECG monitoring 2-4

U

Universal adapter cable 1-2, 1-4

V

Voltage warning vi

W

Warranty vi
Wording, configurable 1-4

Z

ZOLL Administration Software (ZAS) 1-2, 2-6